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## PARALLEL POSTULATE

Mathematics is one of the most important sciences since ancient times. A significant contribution to mathematics was made by Euclid, famous mathematician, often called "father of geometry." He is the author of treatise on mathematics "The Elements", a very important work in the history of mathematics.

The first book is devoted to studying the properties of right triangles and parallelograms. It also considered the famous theorem of Pythagoras, Euclid evidence which was one of the most common of all evidences of modern science. But the most interesting is the fifth postulate of Euclid or also known as the Parallel Postulate.

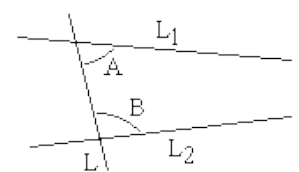
It states that in two-dimensional geometry:

*If a line segment intersects two straight lines forming two interior angles on the same side that sum to less than two right angles, then the two lines, if extended indefinitely, meet on that side on which the angles sum to less than two right angles.*

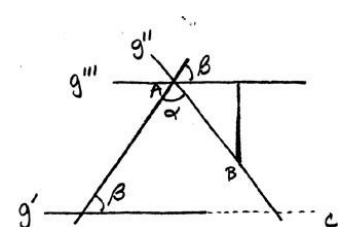
This postulate was commented and studied by many scientists that led to the emergence of non-Euclidean geometry in the New time.

The formulation of the postulate according to the figure is:

*If the sum of two angles A and B formed by a line L and another two lines L1 and L2 sum up to less than two right angles then lines L1 and L2 meet on the side of angles A and B if continued indefinitely.*



The postulate attracted immediate attention. The commentator Proclus tells us that the postulate was attacked from the very start. He wrote, "This postulate ought even to be struck out of Postulates altogether; for it is a theorem...". The statement Proclus proves instead of the parallel postulate is, "Given  $\alpha + \beta = 2d$ , proves that the straight lines  $g'$  and  $g''$  meet at a certain point C." But it is observed by Pogorelov that the parallel straight lines proof of Proclus relies on are not explicitly contained in the other postulates or axioms and therefore cannot be deduced from them.



Another person who attempted to prove the parallel postulate was John Wallis. In addition to Wallis' recognition of the significance of exponents, he also

attempted a proof to the parallel postulate. However, instead of proving the theorem directly with neutral geometry, he proposed a new axiom. In this postulate was expressed the opinion that it was either to increase or shorten the triangle as much as necessary without distortion. Using this Wallis proved a parallel postulate.

In addition to Proclus' and Wallis' proofs, in 1826 another mathematician's replacement of the parallel postulate led to the discovery of Non-Euclidean geometry. This mathematician was N.I. Lobachevsky. Lobachevsky was a Russian mathematician. For his proof to the parallel postulate, Lobachevsky proved that "At least two straight lines not intersecting a given one pass through an outside point." In proving this he hoped to find a contradiction in the "Euclidean corollary system". However, in the development of his theory, Lobachevsky, instead saw that the system was "non-contradictory". From this he drew the conclusion that there existed a geometry, different from Euclidean, which was not connected with parallel postulate. This geometry became known as "Non-Euclidean" geometry.

In conclusion, throughout the past 2300 years of mathematical history many mathematicians from all over the world have unsuccessfully been trying to prove Euclid's parallel postulate. Although these attempted proofs did not lead to the desired result, they did play a part in the development of geometry, enriching it with new theorems that were not based on the fifth postulate, as well as leading to the construction of a new geometry, Non-Euclidean geometry, not based on the parallel postulate.

#### LITERATURE

1. Смилга В. П. В погоне за красотой. Занимательное введение в неевклидову геометрию. — 2-е изд. — М.: Молодая гвардия, 1988. — С. 37-53.
2. Начала Евклида / Перевод с греческого и комментарии Д. Д. Мордухай-Болтовского при редакционном участии М. Я. Выгодского и И. Н. Веселовского. — М.-Л.: ГТТИ, 1948. — С. 36-38.
3. Погорелов А. Геометрия. — Мир: Москва, 1987. — С. 96-101.